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Energy Extension
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How To Get The Most Back For The Least $pent

Economic Weatherization of Your Home

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If you're paying the bills, you already know a lot of your dollars are being spent for energy — electricity, gas and/or oil. In recent years, energy costs have been rising, and it looks like they may continue to rise.

However, one way to keep your rising energy bill down is to reduce the amount of energy you use in your home.

Reducing energy is nothing new. Because the concept is so important, we've been flooded by all kinds of energy-saving recommendations over the years.

But, since you probably can't do everything at once, it's just as necessary you consider which recommendations are the most important to your own particular needs. That's what this booklet is all about — a look at some economical home energy-saving measures you, the homeowner, can take.

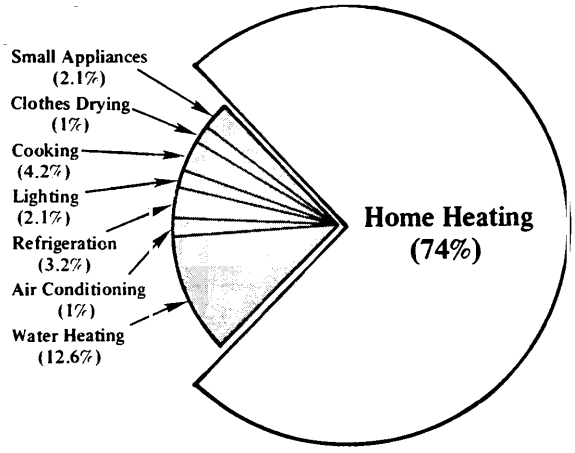
The idea is to do the most cost-effective things first. Doing this will give you much greater total energy savings than applying a large effort to those areas where you only use a small amount of energy — in other words, how to get the most back for the least spent.

Let's take a look at an example of what we mean:

Illustration Number One shows the energy amount (by percent of the total) used for various purposes in this area's average home.

Because of our long, cold winters, your heating system uses about 74 percent of your home's

Figure 1: Energy Use in the Home.



energy. Lighting, on the other hand, uses about 2 percent.

Since space heating is the home's biggest energy user, a small use reduction here will yield you the biggest savings.

If the energy used in home heating is reduced by just 3 percent, the energy saved will equal the **total** energy used for lighting. You can get this 3 percent savings by simply turning down your home's heating thermostat setting by just **one degree** — getting the most back for the least spent!

There are several conservation measures, like turning down the thermostat, which cost little money, but provide significant fuel savings. They're tested, no-risk measures which should be part of any serious household energy conservation program. In energy conservation, little things mean a lot.

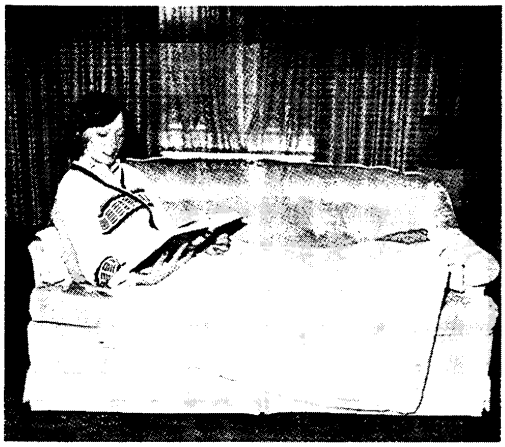
Before beginning a weatherization project, you may want to determine your home's energy index. The booklet, "Is Your Home an Energy Waster?", illustrates some simple calculations which will enable you to determine your home's heating efficiency. This free publication may be obtained from your local county extension office, or from the North Dakota Energy Extension Service, Room 10A, Morrill Hall, North Dakota State University, Fargo, ND 58105.

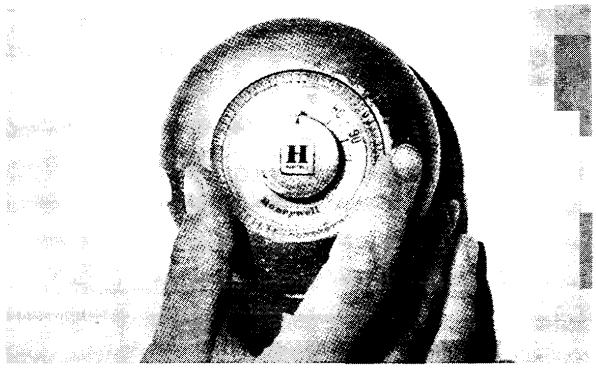
What to Do

Here are five measures you can take to reduce your home's space heating energy. The steps are arranged for the typical North Dakota home in order of greatest savings for lowest cost:

-Controlling Indoor Temperatures.
-Controlling Air Leaks.
-Maintaining Heating Systems.
-Reducing Heat Loss Through Windows.
-Adding Insulation.

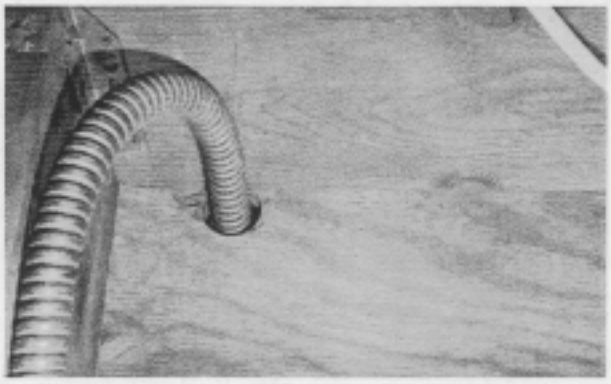
To carry out your own energy reduction program, start with the first step and work your way down the list as far as your budget will allow.

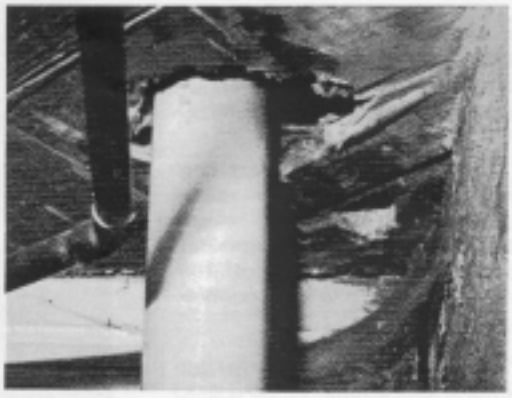


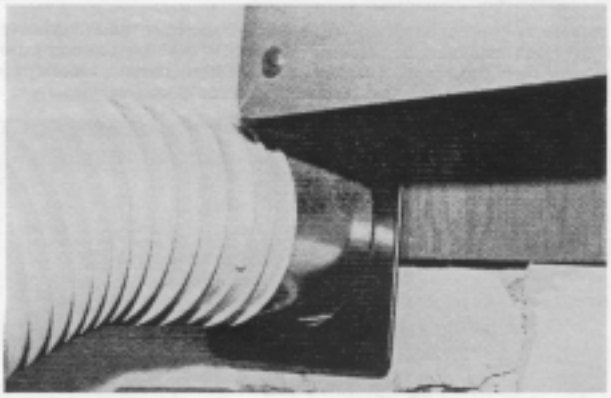


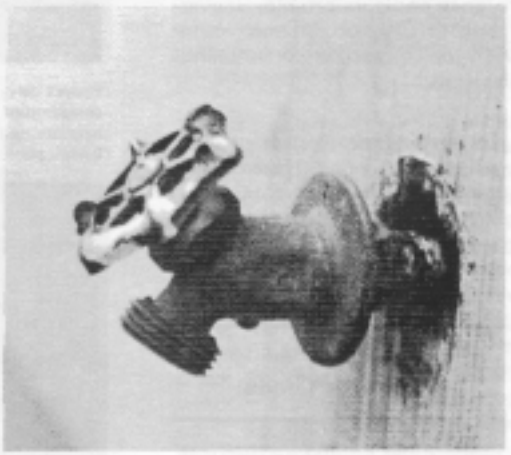
Adjusting your thermostat to a lower temperature (bottom right) doesn't necessarily mean being chilly in your own home. To adjust to a slightly cooler home temperature, use an afghan or blanket to keep warm when you're reading or watching television (top left). Rather than placing your furniture under windows or next to outside walls in often-used rooms (top right), move your sofas and chairs away from exterior walls (bottom left).

One way to keep your heating bill down is to stop drafts in your home. Air leaks around electrical wiring (top left) and plumbing (dryer vent, bottom left; plumbing stack, top right; and outside faucet, bottom right) in your home should be found and caulked or otherwise plugged.









1. Control Indoor Temperature

Thermostat adjustment is one way you can operate your household to use as little fuel as possible. You can save energy by heating or cooling only those parts of the house where it's really necessary.

Turn off the heat or air conditioning in unused rooms. In regularly-used rooms, move chairs and sofas away from outside walls, make sure curtains and furniture aren't blocking radiators and registers and, then, adjust your system to heat or cool only as much as is needed.

For each degree you reduce your indoor temperature during the heating season, you'll use about 3 percent less fuel. For example, turning your thermostat down from 72 degrees to 68 degrees will save about 12 percent of your home's heating energy needs.

Turn the thermostat even further down at night and when you're away from home. An exception is the home with an "exactly sized" furnace (which means it's continually operating on the coldest days). If your furnace is "exactly sized" to your home, leave your thermostat setting alone during cold weather. Turning it down at night or during short absences will mean you'll have to wait a very long time to get your home warmed up again. **Warming your house back up does not use more fuel than you've saved.**

During the summer, set your air conditioning at 78 degrees or higher and pull the window shades to keep the sunshine from warming the room.

A point to remember — when cutting off heat or reducing indoor temperatures, make sure you don't freeze your water pipes. If necessary, use heat tapes and insulation to protect exposed pipes.

Also remember that some pipes may be located within your home's outside walls. While these pipes can sometimes be insulated or wrapped with heat tape, another precaution is to make sure your room temperature is high enough to keep the wall pipes from freezing.

Thermostat adjustments cost nothing, but can save significant

fuel. If you wish, you can invest in a clock thermostat which adjusts indoor temperatures automatically.

Lowering your thermostat setting doesn't necessarily mean you'll be living in a "cold" house. After you've turned the thermostat down, there are a number of little things you can do to keep comfortable.

Wear warmer clothing, for example – wooly-type things which are loose and comfortable. Use an afghan or blanket to keep warm while you're reading or watching television.

Use an electric blanket or mattress pad on the bed. Their cost is minimal, and they add a lot to your comfort. (Using an electric blanket on a medium setting in a 62-degree room costs less than five cents every eight hours!)

2. Control Air Leaks

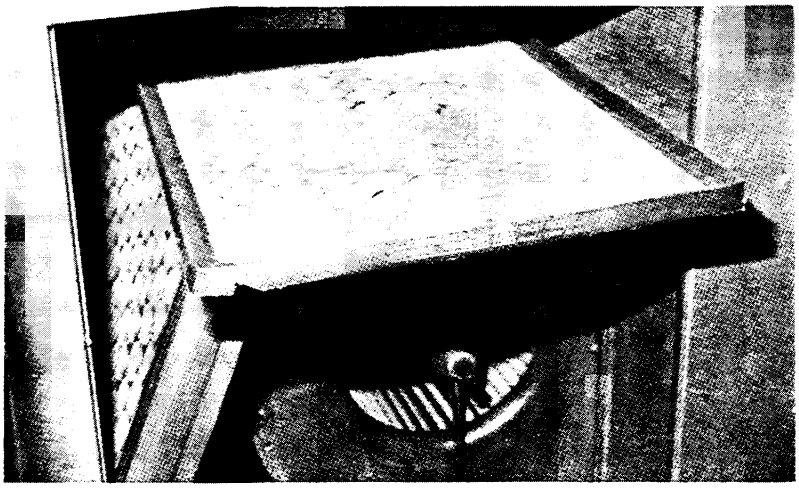
Rather than turning up the heat, eliminate the drafts. Air leaks are usually the greatest single cause of a home's heat loss.

You can plug up most cracks letting cold air into your home for very little cost and a small labor investment. Air leaks around doors and windows, through attic openings, above the foundation wall and around the chimney, plumbing and electrical wiring can be stopped by caulking and weatherstripping.

Another major cold air source is frequent door opening. No matter how well you weatherize your home, you're still wasting money by opening doors too often.

Try to use a door protected by an enclosed area, such as an attached garage, enclosed porch or vestibule. For active families, especially, entering the home through an enclosed space can save heat — again, at no cost!

To save money, you may consider sealing off unused doors for the winter. Sealing a door is fine — but make sure it can be easily opened in an emergency!



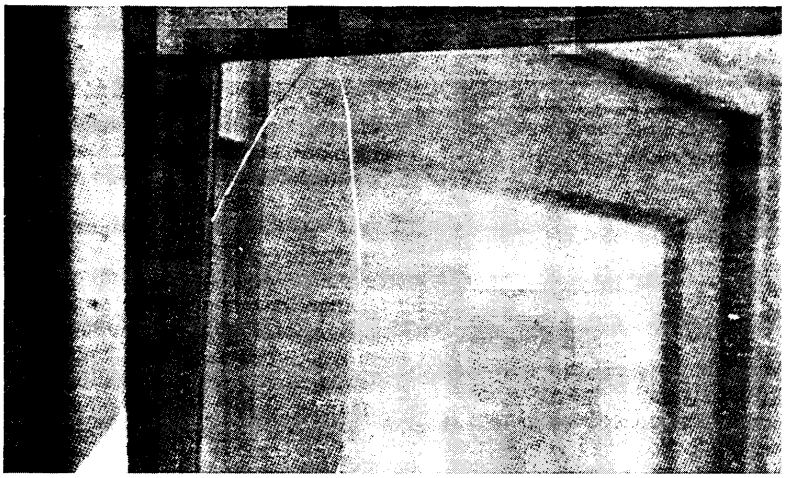
Proper care and maintenance of your home heating system is an absolute "must" in home energy conservation. If you don't maintain your furnace properly, it will have to run longer than necessary and use more fuel. Make sure a check of your air filters (above) a monthly routine. Check your ducts and registers (below), and keep them clean and dust-free.

3. Maintain Heating System

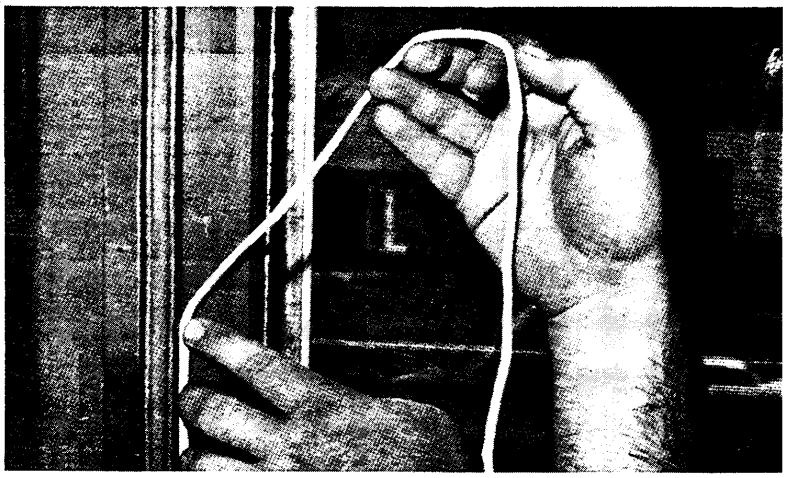
If not properly maintained, your furnace will have to run longer than necessary and use more fuel. Heating systems should be given routine maintenance every year to keep them running efficiently.

If you own a forced-air heating system, check your air filters monthly. While you're at it, keep ducts and registers clean and dust-free.

Ask your service representative to show you how to change air filters. Filter change frequency will vary from one family to another, depending on family activities and



Because windows can be some of the greatest heat stealers in your home, their proper care and maintenance is an important means of controlling heat loss. Cracked and broken window glass (above) should be repaired. If you've a window that won't be opened during the cool months, plug the crack between the sash and the window frame with something like a rope-type caulk.



the number of people living in the home.

Also ask your service representative to help you check your entire system carefully for things needing additional work. Seal ductwork leaks and insulate all ducts exposed to the outside cold in attics, crawl spaces or garages.

If you have hot water or steam heat, make sure you insulate all pipes exposed to the outside cold. But, since heat escaping from ducts and pipes often helps warm enclosed basements and crawl spaces, make sure your duct insulation won't cause your plumbing to freeze.

If your heating system is less than 75 percent efficient, re-evaluate the situation — it may pay to have it replaced.

Be extra cautious if you're planning to save energy by replacing or modifying your existing heating system. Consult your building inspector, a reputable local heating contractor, your utility company, Energy Extension agent and/or the Cooperative Extension Service to make sure energy-saving equipment is safe and will, in fact, meet energy-saving claims.

4. Reduce Heat Loss Through Windows

To some degree, windows are uninsulated holes in your home. Even with three layers of glass or plastic, window heat loss is at least 10 times greater than that through a well insulated ceiling of the same size.

First of all, reduce window heat loss by reducing window air leakage. Replace broken and cracked window glass and replace loose or missing putty. Caulk around window frames, both inside and outside.

For windows which won't be opened during the winter, plug the crack between the sash and the window frame with a rope-type caulk. To further reduce heat loss, use storm windows and add a third layer of sheet or bubble plastic on the inside window, or between the inside and storm windows.

A simple method of window insulation is keeping a durable roller shade pulled whenever the sun goes down. Closed draperies are useful if they fit the window so tightly air cannot circulate between the window and the drapery.

You may be considering installing a tight-fitting movable insulation on the inside of your windows. If you do, remember to check daily for condensation, which can damage the window's paint and wood.

Make sure whatever you do creates no fire hazard, and windows can still be opened quickly if needed for emergency escapes.

5.
Add Insulation (carefully)

If there's one piece of general advice governing home insulation, it's **"Be Cautious!"** Insulation is the most complicated (and potentially most expensive) of the five steps.

Insulation is also the measure most apt to involve the hiring of contractors. Unless you choose proven material and install it properly, insulation can cause problems.

The effectiveness of different insulation types and thicknesses is indicated by "R-value." R-value is a measure of how well a material resists transmitting heat — in other words, how well it keeps heat from passing through your home's walls, ceilings and floors. The higher the R-value, the more effective the insulation.

Purchase insulation according to its R-value. Two materials of the same thickness can be substantially different in how well they insulate.

When thinking of your budget, approach insulation the same way as home weatherization in general: by doing those steps which are easiest and least expensive first.

Insulate your home in the following order:

(A) Attics or Ceilings:

Ceilings are usually easy to insulate. Determine the insulation type now in your attic and measure its thickness.

If you're a do-it-yourselfer, remember adding insulation is **not** simple. Vapor barriers, attic ventilation and the safety and efficiency of different materials are critical considerations. Improper installation can cause structural damage to your home and ruin the insulation, wasting your investment.

For help or information, contact your local Cooperative Extension agent or the North Dakota Energy Extension Service.

(B) Top of the Foundation Wall:

An important area to insulate is the top of the foundation wall. This section has several names, such as box sill, band joist and shelf.

Caulk any cracks to prevent air leakage into the home, then insulate by pressing 6-inch fiberglass batts snugly into place.

(C) Floors Over Unheated Areas:

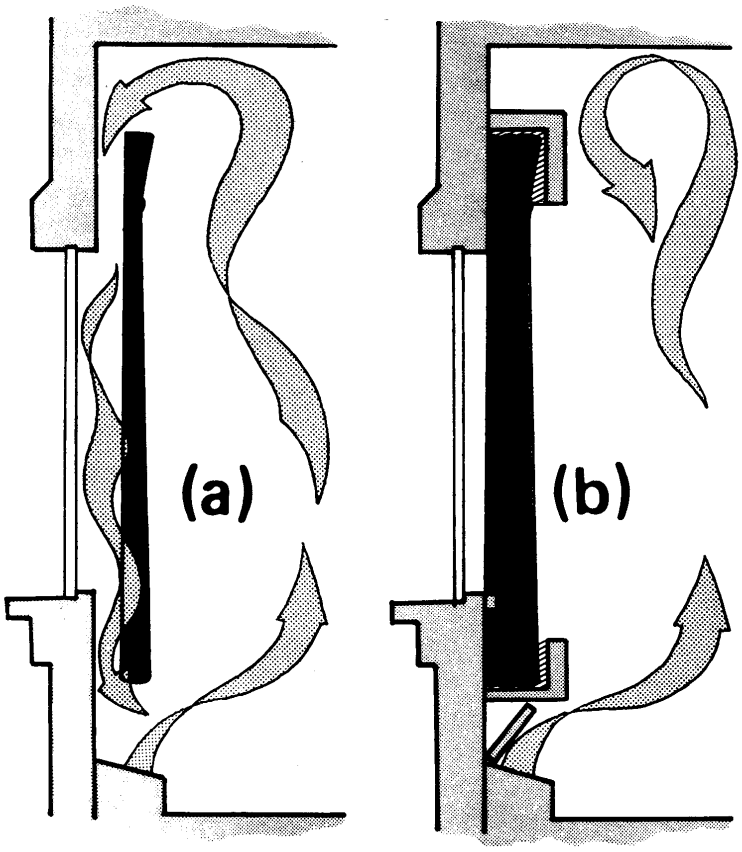
Insulate the underside of floors covering areas exposed to **outside** temperatures, such as crawl spaces, garages or basements. These spaces should be insulated to a minimum of R-22.

When using insulation with a vapor backing material (brown paper or foil), make sure the vapor barrier is facing up, toward the heated room.

(D) Foundation Walls:

Foundation walls can be insulated from the outside or inside. On the outside, insulate the foundation wall's exposed portions down to a level at least two feet below grade. Rigid board insulation (styrofoam and urethane foam) can be added outside the wall, with

Figure 2: Loose Fit — Tight Fit



Draperies can reduce window heat loss if they fit so tightly air cannot circulate between the window and the draperies. Loose-fitted draperies (a) allow cold air to move from the window glass into the room, while tightly fitted draperies (b) stop cold air from moving into the room by preventing convection.

the above-ground portion protected by asbestos cement board or similar material. (Sunlight causes the insulation to deteriorate.)

A more expensive alternative is building a frame wall on the foundation's inside, and insulating between the studs or gluing rigid board insulation to the foundation wall.

To ensure fire safety, cover all insulation materials according to manufacturer's recommendations.

(E) Uninsulated Frame Walls:

Uninsulated frame walls are the last area of the house to insulate because they're the most difficult and, therefore, the most expensive. It's worthwhile to insulate them if other, more cost-effective, measures have been completed, and if you use properly installed, proven insulation products.

Normally, **don't** add insulation to walls already containing some insulation.

Winterization and Moisture

If you winterize to reduce heat loss, you'll also reduce the amount of moisture lost from your home. Although this will provide greater comfort, it can lead to excessive moisture problems. Here are some precautions you should take:

- If your furnace has an automatic humidifier, be sure its control works and is never set above 30 percent relative humidity. You may have to lower the setting to 20 percent when the outside temperature drops below 0°F.

- Discontinue or limit your use of portable humidifiers. Keep home humidity low enough to prevent condensation from forming on windows. In a house where air leaks have been carefully caulked and weatherstripped, humidifiers are not usually necessary.

- Normally, your electric clothes dryer should be vented to the outside. But, if you vent it inside the house, watch for condensation on windows and exterior walls. If it occurs, vent the dryer to the outside. (**Never** vent a **gas** clothes dryer inside the house!)

The top of the foundation wall, often called the box sill, band joist or shelf, is an important area of your home to insulate. First, caulk any cracks to prevent air leakage, then insulate by pressing 6-inch fiberglass batts snugly into place.

Let the Weatherizer Beware

Like all home improvements, weatherization takes planning and care. Among its challenges are the complicated issues of safety and efficiency, the selection of proper materials and the selection of qualified contractors for those jobs you choose not to do alone.

Some utilities offer home "energy audits," advising you how to reduce the energy needed to heat your home. Call your utility and ask if such assistance is available.

Here are some points to consider when planning your home weatherization program:

- Remember home weatherization measures may be relatively permanent. Take the time to investigate available materials and make choices suitable for your home. Generally, purchase the highest-quality materials you can afford.

- Keep in mind claims of fuel savings for different measures and different materials should only be regarded as "guesstimates." Actual savings will depend on such variables as your home's quality.

- In insulation materials, there's often a difference in the material's "theoretical" and "in-place" insulating value. In other words, the material's theoretical insulating value may be higher than after it's been installed

and gone through settling or shrinkage. Be sure to investigate the material's after-installation insulating value.

Before choosing a contractor, obtain several cost estimates from well-established weatherization firms. Ask contractors to give you the name of several prior customers, and check to make sure past customers are satisfied. Make sure all contracts, guarantees and sales promises are in writing.

- Be wary of new "energy-saving" products and devices. Some may be quite good, but few have been tested by reputable laboratories. The best advice is to be skeptical of new products which haven't been approved by reputable underwriters.

- Many homeowners think about supplementing their conventional heating systems with solar systems or woodburning equipment.

Don't consider a solar system until you've accomplished the weatherization measures outlined in this publication. At today's prices, solar heating is more expensive than any other heating system. Make your home energy efficient **before** trying to install a solar heating system.

There are many woodburning stoves now on the market, and they vary a great deal in efficiency. Unless you purchase an efficient stove and burn only properly prepared wood, you can actually spend more money on wood heat than on conventional heat. Carefully follow manufacturers' instructions and local codes to ensure proper, safe installation and use.

Even at their best, fireplaces are only about 10 percent efficient. They're not a good way to heat and, when outside temperatures are 40°F or lower, actually draw more warmth from your home than they add. When a fireplace is not in use, make sure its damper is tightly closed, to limit the warm air loss up the chimney.

Well, there you have it. This has just been a peek at some things you can do to save home energy. If you have more specific questions regarding home energy conservation, contact your local North Dakota Cooperative Extension agent, or the North Dakota Energy Extension Service.

COOPERATIVE EXTENSION SERVICE

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